Hudson River PCBs Site

Engineering Performance Standards For Dredging

Presentation to Peer Review Panel

Malcolm Pirnie, Inc.
TAMS, *an EarthTech Company*

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Productivity

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Presentation Outline

- Definition of the Productivity Standard
- How it was developed
- Why it is feasible
- Key issues raised during the public review process:
  - Interaction with Resuspension & Residuals Standards

Productivity Performance Standard

Objective

- Monitor and maintain the progress of the dredging to meet the 6-year duration stated in the ROD

Framework of the Productivity Standard

- Phase 1 and Phase 2 standards
- Targets & Requirements
- Action Levels and Required Responses
- Other constraints

Productivity Performance Standard

Components

- Complete dredging in 6 years:
  - Phase 1: One year at reduced scale
  - Phase 2: Five years at full scale
- Backfill and stabilize shoreline by end of each year
- Process and transport sediment to offsite disposal by end of each year

Phase 1 Performance Standard

- ~240,000 cubic yards (or about one-half the minimum annual for Phase 2, whichever is less)
- 30 days operating at full scale rate
- Seasonal “Closeout”

Phase 2 Performance Standard

- Cumulative Targets…4 ½ seasons (530,000 CY/yr)
- Cumulative Requirements…5 seasons (480,000 CY/yr)
- Seasonal “Closeout”

Performance Standard Volumes

Project Phase and Year	Required Cumulative Volume (cubic yards)	Target Cumulative Volume (cubic yards)
Phase 1 (Year 1)	approx. 240,000	265,000
Phase 2 (Year 2)	720,000	795,000
Phase 2 (Year 3)	1,200,000	1,325,000
Phase 2 (Year 4)	1,680,000	1,855,000
Phase 2 (Year 5)	2,160,000	2,385,000
Phase 2 (Year 6)	2,650,000	2,650,000

Action Levels and Required Responses

Action Level	Situation	Response
Concern Level	Monthly production rate falls 10% or more below scheduled rate.	Notify USEPA and take immediate steps to erase shortfall in production over next two months.
Control Level	Production falls below scheduled production by 10% or more for two or more consecutive months.	Submit an action plan to EPA explaining the reasons for the lower production and describing the engineering and management actions taken or underway to increases production and erase shortfall by end of the dredging season.
Standard	Annual cumulative volume fails to meet production requirements.	USEPA action to be determined based on Agency review of specific circumstances.

Standard Development: Key Calculations & Basis

- 2.65 Million CY, 6 Dredging Seasons (per ROD)
- Phase 1 Production Volume = ½ x 2,650,000 / (5 + 0.5) = 240,000 CY
- Phase 2 Production Volume = 2,650,000 – 240,000 = 2,410,000 CY
- Phase 2 Annual Production Volume = 2,410,000 / 5 = 480,000

Productivity Schedule

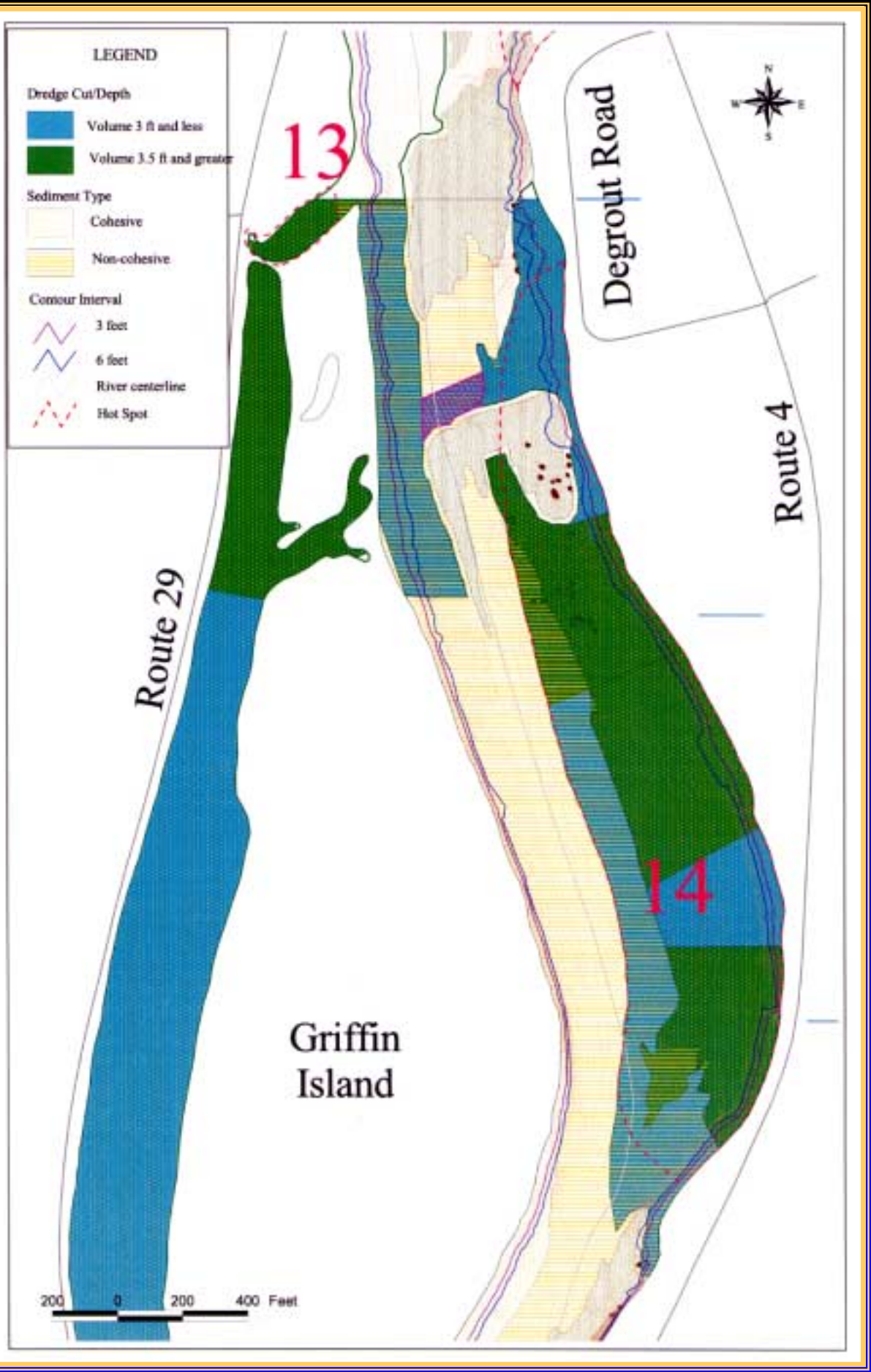
- Depicts an example feasible scenario for meeting Phase 1 and Phase 2 cumulative targets
- Conceptual CPM schedule (Primavera®)
- Conservative
- Conventional Equipment

Key Constraints for Schedule Development

- Complete an area before removing containment (if utilized)
- Work generally upstream to downstream within a given pool
- Limit obstructions to flow or navigation
- Seasonal closeout
- 6 days / week

Key Assumptions Supported with Conceptual Analysis

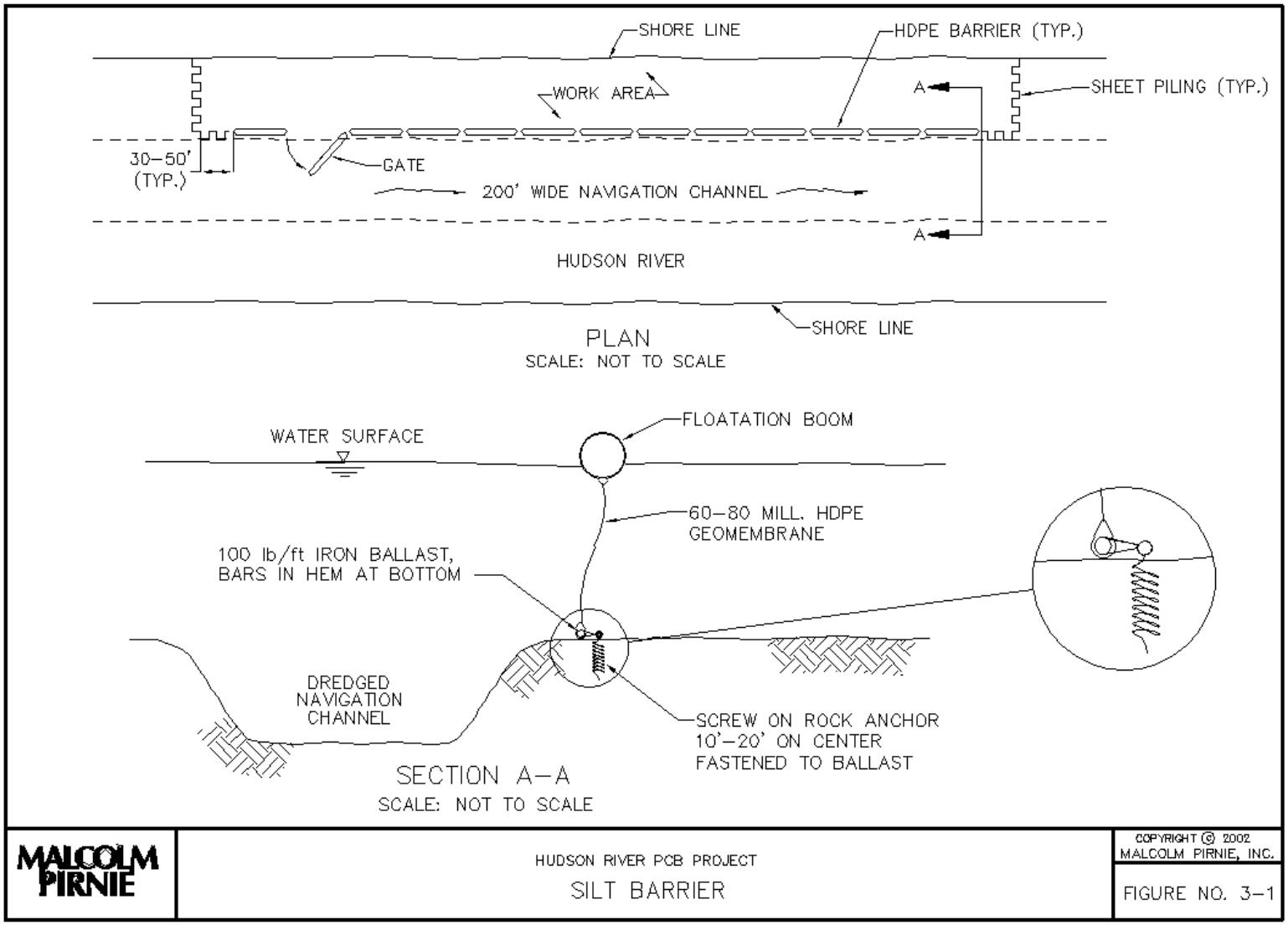
- Processing / Transportation can “keep up” with dredging
- Mechanical Dredging Scenario is conservative for River Section 1
- Redredging is 50% of the duration to initially dredge a certification unit


LEGEND
Dredge Cut/Depth
Volume 3 ft and less
Volume 3.5 ft and greater
Sediment Type
Cohesive
Non-cohesive
Contour Interval
3 feet
6 feet
River centerline
Hot Spot
13
14
Degrout Road
Route 4
Route 29
Griffin Island
200 0 200 400 Feet

Production Factors

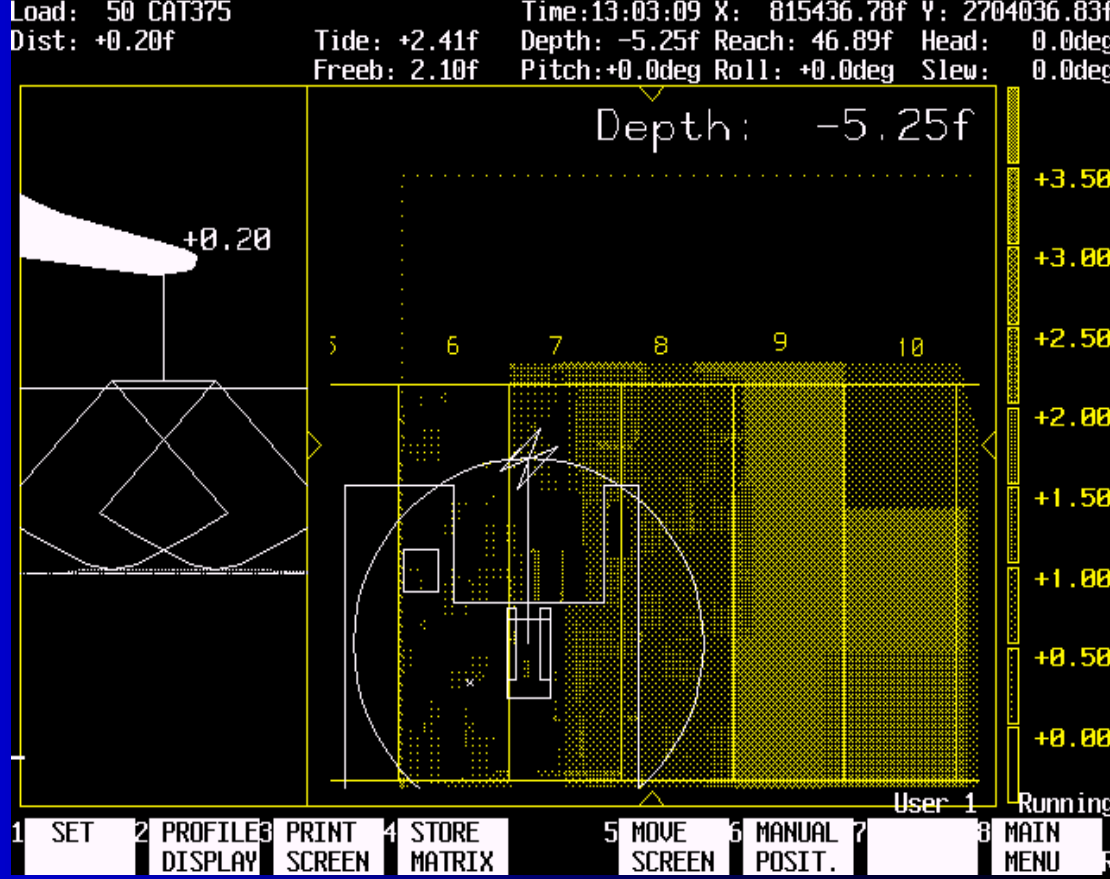
- **Silt Barrier Installation and Removal**
  - Installing sheet piling – 90 LF/day/crew
  - Installing HDPE barrier – 200 LF/day/crew
- **Mechanical Dredging (Horizontal Profiler)**
  - 82 CY/hour (large “production” dredge)
  - 27 CY/hour (small “alternative” dredge)
- **Backfill**
  - 1 acre/day for “non-critical” areas
  - ½ acre/day for “critical” areas

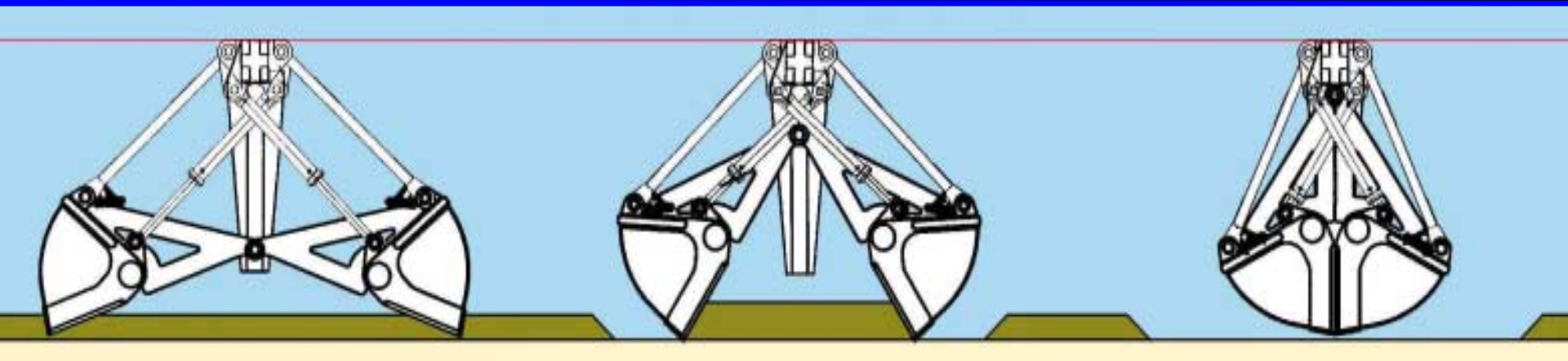
Typical Containment Detail



Source: Bean Environmental

- Right: Dredge Operator's View / Screen Display
- Below: Horizontal cut





Source: Bean Environmental

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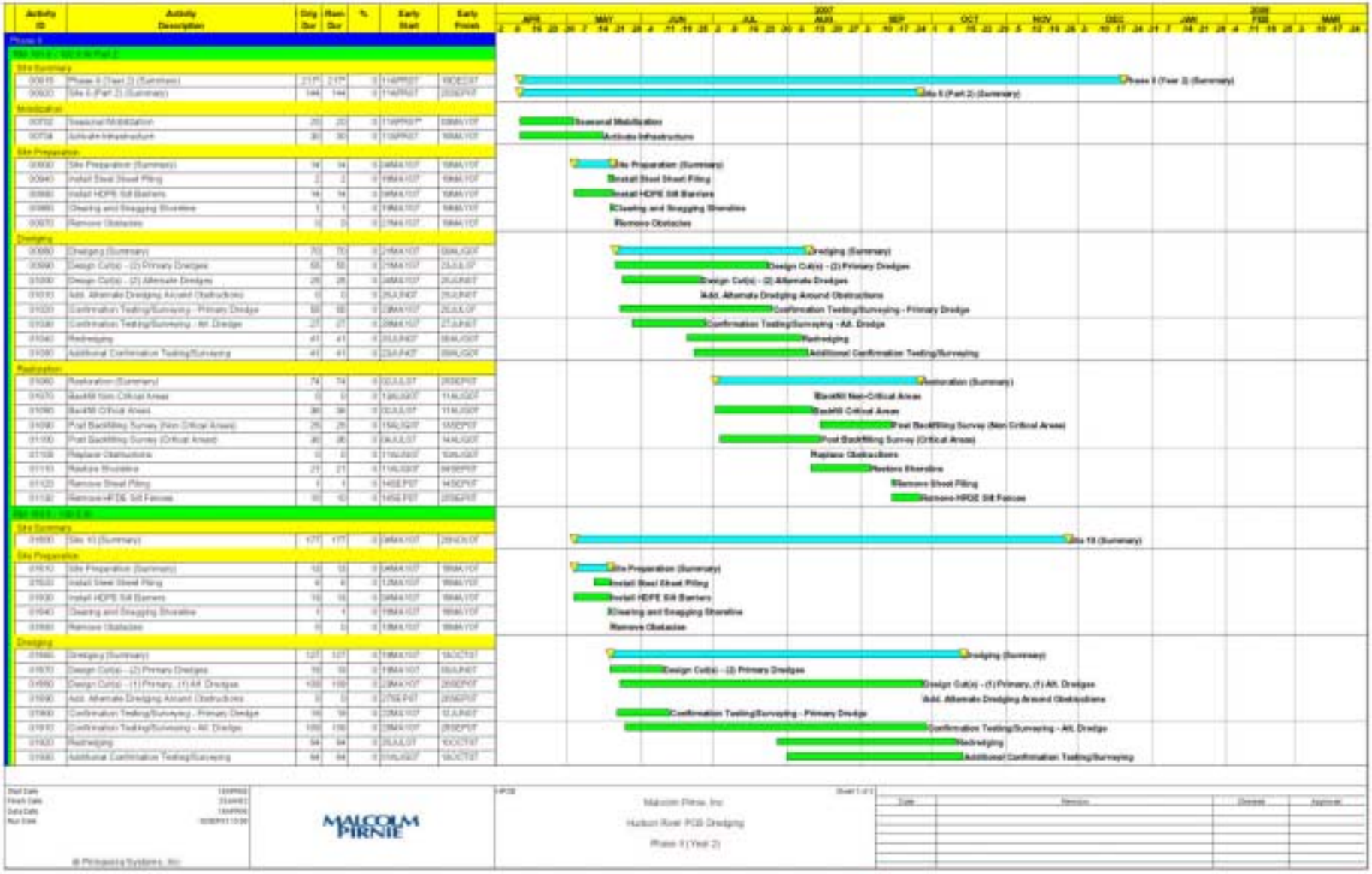
Productivity Schedule Conclusions

- Schedule is conservative
  - Mechanical dredging (slower)
  - Containment
  - Other constraints that affect sequence
- Depicts
  - ~270,000 CY dredged in Phase 1
  - Exceeds productivity targets for all five years of Phase 2


Activity ID
Activity Description
Orig Dur
Rem Dur
%
Early Start
Early Finish
2007
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
2008
JAN
FEB
MAR
Phase II
Site Summary
Site II (Part 2) (Summary)
Mobilization
Seasonal Mobilization
Activate Infrastructure
Site Preparation
Site Preparation (Summary)
Install Steel Sheet Piling
Install HDPE Silt Barriers
Clearing and Snagging Shoreline
Remove Obstacles
Dredging
Dredging (Summary)
Design Cut(s) - (2) Primary Dredges
Design Cut(s) - (2) Alternate Dredges
Add. Alternate Dredging Around Obstructions
Confirmation Testing/Surveying - Primary Dredge
Confirmation Testing/Surveying - Alt. Dredge
Redredging
Additional Confirmation Testing/Surveying
Restoration
Restoration (Summary)
Backfill Non-Critical Areas
Backfill Critical Areas
Post Backfilling Survey (Non Critical Areas)
Post Backfilling Survey (Critical Areas)
Replace Obstructions
Restore Shoreline
Remove Sheet Piling
Remove HPDE Silt Fences
Site 10 (Summary)
Malcolm Pirnie, Inc
Hudson River PCB Dredging
Phase II (Year 2)

Why It's Feasible: Conservative Aspects of Productivity Schedule

- Use of containment
- Limited number of dredges working (four 4-cy, four 2-cy)
- Conservative production factors
  - 13 hours full production / day
  - For example: used 82 CY / hr when dredge typically performs 95 – 120 CY / hr

Mechanical Dredging Production Rates

- Typical Cycle Time (Production Dredging) = 50-60 cycles/hr
- Assume 4 cy Bucket – 90% Full
  0.90 x 4.0 cy = 3.6 cy/cycle
- 50 cycles/hr = 50 x 3.6 cy/hr = 180 cy/hr
- 60 cycles/hr = 60 x 3.6 cy/hr = 216 cy/hr
- Example Schedule Assumes:
  82 cy/hr when dredging

Mechanical Dredging Productivity (Continued)

- Available Days = 210 Per Season (30 wks)
- Available Dredging Hours Per Season: @ 24 hr/day; 6 day week = 4200 hr
- Required Dredging = 480,000 cy/season
- Minimum Production Rate Req'd: 480,000 cy/4200 hr = 114 cy/hr

  At 82 cy/hr Rate, Need two 4-cy dredges
- Proposed four 4-cy and four 2-cy dredges

Mechanical Dredging Productivity Continued

- Target Production Rate = 530,000 cy/season
- 530,000 cy/4200 hr = 126 cy/hr
- At 82 cy/hr Rate, Need 2, 4 cy Dredges
- Proposed 4, 4 cy and 4, 2 cy Dredges

Mechanical Dredging Case Study

New Bedford Harbor PDFT
Summary of Dredge Performance Tests Results

Sediment removal accuracy	*Within 4 inches*
Transportation and disposal efficiency	*70% Solids by volume*
PCB removal efficiency	*97% removal*
Water quality impact	*Acceptable impact*
Air quality impact	*Acceptable impact*
Production	*95 – 120 cys / hour*

Hydraulic Dredging Production Rates

- Dredge Evaluated – 12 inch cutterhead dredge, 600 HP Dredge Pump
- Optimum Production Rate – 470 cy/hr Avg. (Area coverage mode)
- Typical Efficiency – 62% Optimum Production Rate

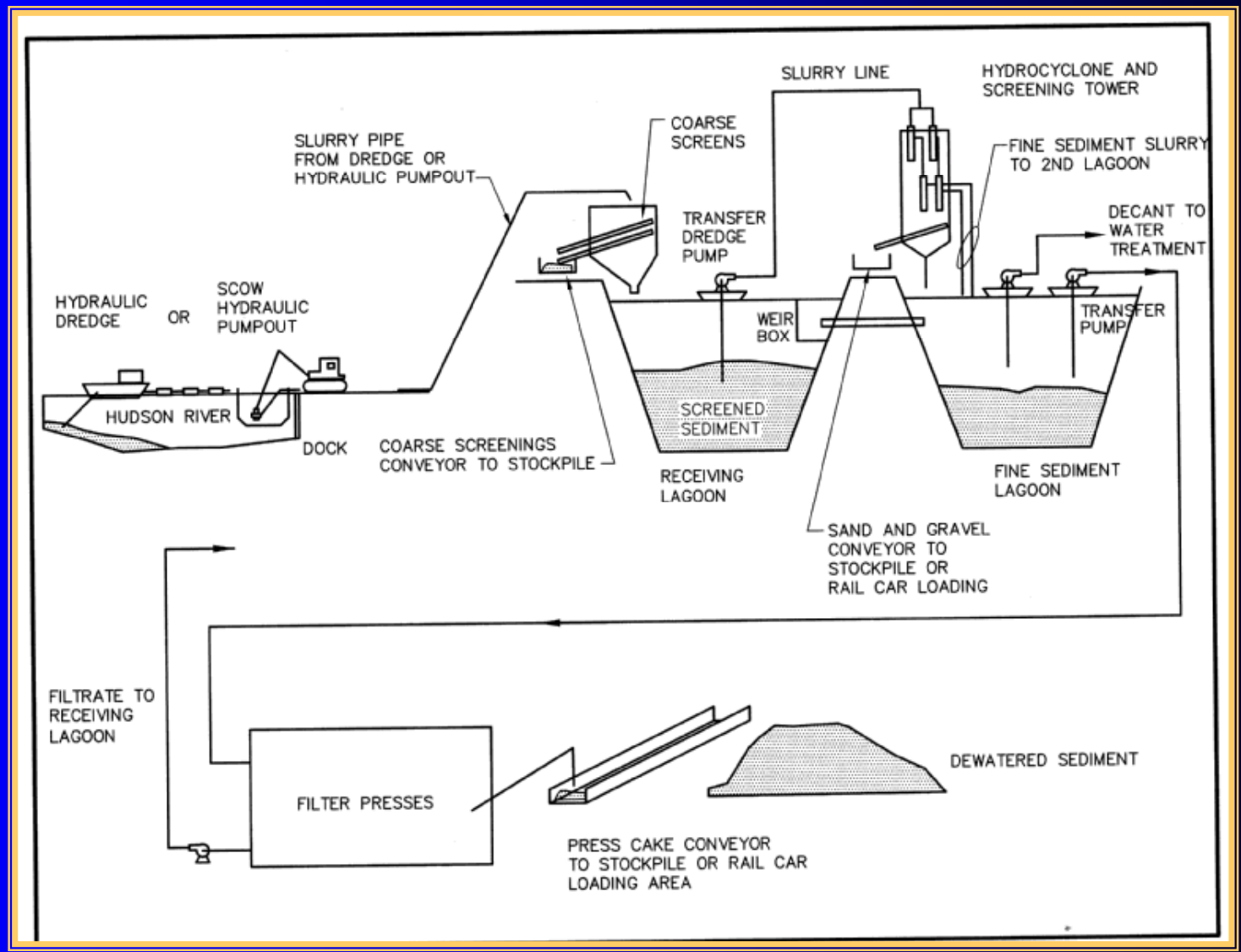
Hydraulic Dredging Production Rates (Continued)

- Maximum Production at Optimum Rate: @ 24 hr/day; 6 day/wk = 4200 hr x 470 cy/hr = 1,974,000 cy/season
- Req'd Efficiency at Productivity Standard
  - 480,000 cy/ 1,974,000 cy = 24.3%

Case Study: Grand Calumet River

- 12-inch hydraulic dredge
- 8-inch hydraulic dredge
- Production: 2/16/03 - 9/10/03 = 543,000 cy
- 175 days, 24 hr/day, 6 day/week
- Equal to Hudson River target dredging rate

Conceptual Dewatering System



Hydrocyclone-Screening Tower

Confined Disposal Facilities
Sand Separation at Slufter

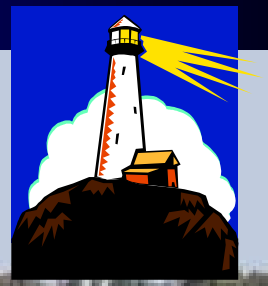
Separation of 220,000 tons dry solids sand from dredged material

Hydro-cyclones and separation (settling) basins

On-Shore Processing Conceptual Water Treatment

- Ballasted Flocculation and Settling System
- Mixed Media Pressure Filters
- GAC Pressure Filters
- All Available as Prefabricated Systems

Conclusions



- Assumptions used to develop Productivity Standard are conservative
- Proper design, scheduling, and construction management will make Productivity Standard achievable

Public Comment

- Comment: Dredging faster will increase resuspension
- Response: Expeditious completion with the right equipment under normal operation reduces resuspension losses

Interaction with Other Standards

- Comment: Processing can't keep up with dredging
- Response: A properly designed facility will easily handle daily & peak volumes

Interaction with Other Standards

- Comment: Redredging will go on forever
- Response: The residuals standard, while protective, is flexible to handle most contingencies:
  - Limits # of redredging passes to 2
  - Allows capping

The End

END

Redredging Assumptions & Basis

- Assumption for Productivity Schedule: Redredging takes 50% of the number of days to perform design cut
- Basis: Our estimate….45%
  - Uses existing equipment
  - ½ of sites are clean after each attempt
  - Limited to 2 redredging attempts (per Residuals Standard)